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An Evaluation of the Toxicity of Sediments from Two Long Island Sound Historic Disposal Sites to *Ampelisca abdita*

**LONG ISLAND SOUND DREDGED MATERIAL
DISPOSAL SITE DESIGNATION
ENVIRONMENTAL IMPACT STATEMENT**

**An Evaluation of the Toxicity of Sediments from Two Long Island Sound Historic Disposal
Sites to *Ampelisca abdita***

**Long Island Sound Dredged Material Disposal Site Designation
Environmental Impact Statement**

**Contract Number DACW33-01-D-0004
Delivery Order 0013**

to

**U.S. Army Corps of Engineers
North Atlantic Division
New England District
696 Virginia Rd.
Concord, MA 01742-2751**

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**Battelle
397 Washington Street
Duxbury, MA 02332
(781) 934-0571**

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1.0 INTRODUCTION

The U. S. Environmental Protection Agency (EPA) - Region I, New England and Region II, New York in cooperation with the U.S. Army Corps of Engineers (USACE), New England District will prepare an Environmental Impact Statement (EIS) to consider the potential designation of one or more dredged material disposal sites in the waters of Long Island Sound (LIS) in compliance with Section 102(c) of the Marine Protection, Research and Sanctuaries Act and 40 C.F.R. 230.80 of EPA's regulations under Section 404 of the Clean Water Act. The EIS will provide an evaluation of the existing sites known as the Western Long Island Sound Disposal Site (WLIS) and Central Long Island Disposal Site (CLIS), as well as additional alternatives including the historically used Bridgeport Disposal Site and Milford Disposal Site (Figure 1), other types of dredged material disposal and management, and the no action alternative.



Figure 1. Location of Existing and Alternative Dredged Material Disposal Sites under Consideration in Western and Central Long Island Sound

Under the Long Island Sound Dredged Material Site Designation EIS Project, the USACE and EPA have previously studied the two existing dredged material disposal sites (WLIS and CLIS) and, for consistency, decided to study the chemical, physical, toxicological, and benthic condition of the two alternative sites (Bridgeport and Milford). The Bridgeport Disposal Site was closed in 1977 after approximately 25 years of use during which it received about 4.2 million m³ of dredged material. The site was not monitored until a side-scan sonar and REMOTS™ survey was conducted under the Disposal Area

Monitoring System (DAMOS) Program in August 1992 (Caporelli and Browning, 1996). Results of the side-scan survey indicated that well-defined mounds of dredged material were not present at the site, although relic dredged material was present throughout the site in low relief. The REMOTS images showed that the site has experienced some physical and biological disturbances, but generally supports a relatively healthy benthic community. The Milford site last received dredged material in 1971. During the period 1954 to 1971, about 305,000 m³ of dredged material was disposed of at the site (USACE unpublished data). There has been no recent monitoring of conditions at the site. The purpose of this report is to describe the results of toxicity tests conducted using sediments from the Bridgeport and Milford disposal sites.

2.0 METHODS

The sediment samples for this toxicology study were collected, stored, and analyzed following procedures specified in the *Quality Assurance Project Plan for Long Island Sound Dredged Material Disposal Site Evaluation Project* (Battelle, 2002a). Additional information about the field survey is contained in the survey report (Battelle, 2002b).

2.1 Field Sampling Program

Sediment samples were collected from the Bridgeport and Milford sites in Long Island Sound on July 29–30, 2002 (Battelle, 2002b). At each disposal site, samples were collected from three “in-site” stations and one reference station (Figure 2, 3, Table 1).

Sediment samples were collected using a 0.1-m² Young grab-sampling device. Each sediment sample was mixed using pre-cleaned Kynar-coated utensils until it was homogeneous and then subsampled for the targeted chemical parameters and toxicity testing. Battelle was directed by the Corps to collect one combined sediment sample for toxicity testing from each station using equal amounts of sediment from each of the three chemistry grabs at each station. Toxicity samples were labeled by using the NavSam[®] labeling system and stored chilled (~4 °C) until they were shipped via overnight courier to the Battelle Marine Sciences Laboratory (MSL) in Sequim, Washington in ice-filled coolers.

**Table 1. Long Island Sound Station Locations for Samples Used in the Toxicity Testing
(from Battelle, 2002b).**

Sample ID	Station Name	Latitude ¹ (°N)	Longitude ¹ (°W)	Sample Date/Time	Depth (m)
LIS1S02BTX1	BP Reference BP-R1	41.07367	73.17326	07/29/2002 15:05:10	21.3
LIS1S01FTX1	Bridgeport Disposal Site BP-	41.07702	73.20406	07/29/2002 13:00:17	19.2
LIS1S012TX1	Bridgeport Disposal Site BP-	41.07337	73.21606	07/29/2002 11:14:31	19.5
LIS1S04ATX1	Bridgeport Disposal Site BP-	41.06646	73.22891	07/29/2002 8:48:56	21.0
LIS1S062TX1	Milford Reference MF-R1	41.11778	72.99799	07/30/2002 11:02:16	21.0
LIS1S068TX1	Milford Disposal Site MF-04	41.12698	73.03419	07/30/2002 11:58:08	17.1
LIS1S036TX1	Milford Disposal Site MF-06	41.12226	73.04005	07/29/2002 17:24:13	18.3
LIS1S053TX1	Milford Disposal Site MF-29	41.10865	73.02220	07/30/2002 8:58:24	21.6

¹ – Coordinates are in North American Datum 1983.

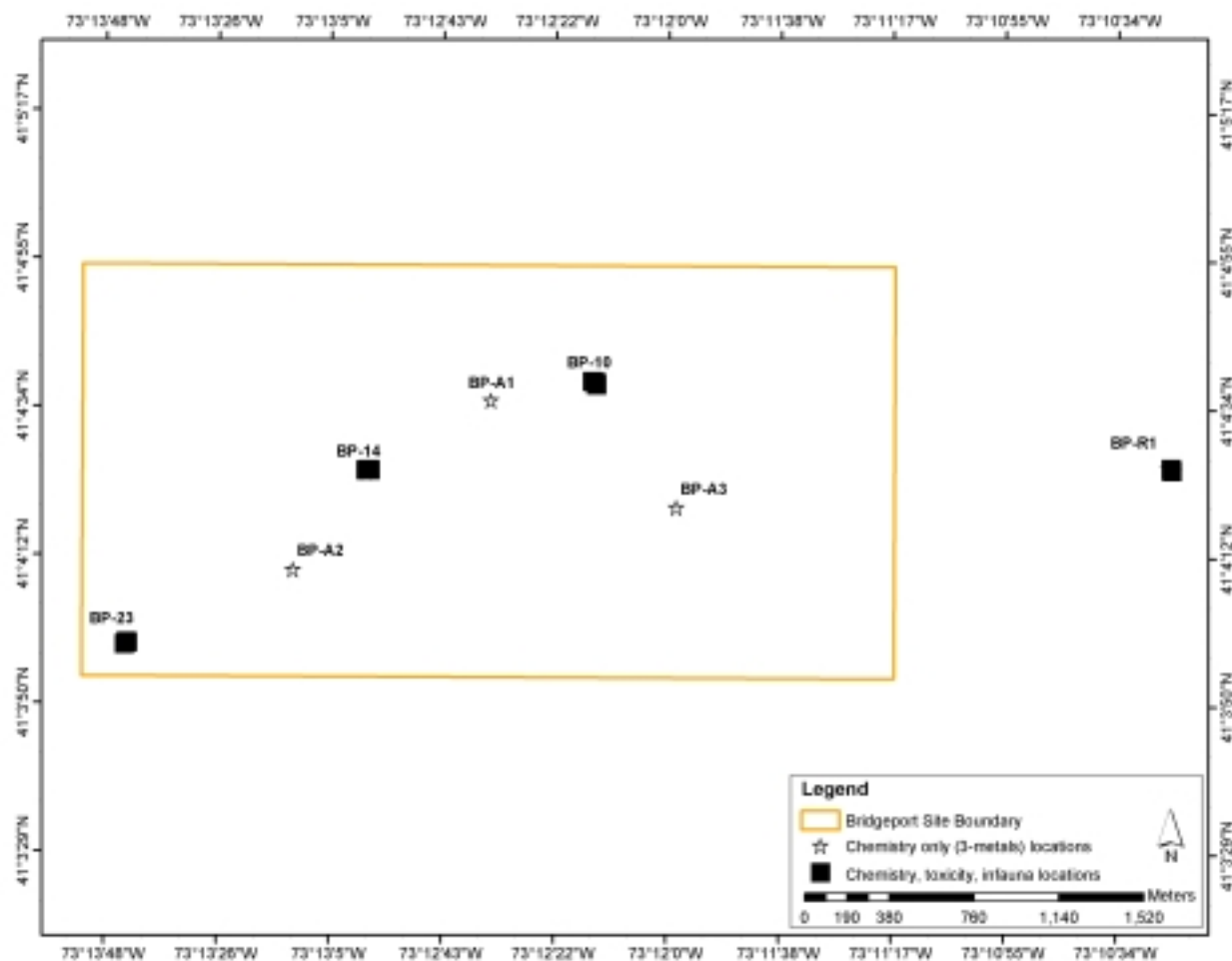


Figure 2. Locations of Stations within the Bridgeport Disposal Site Area Sampled for Use in the Toxicity Testing (from Battelle, 2002b).

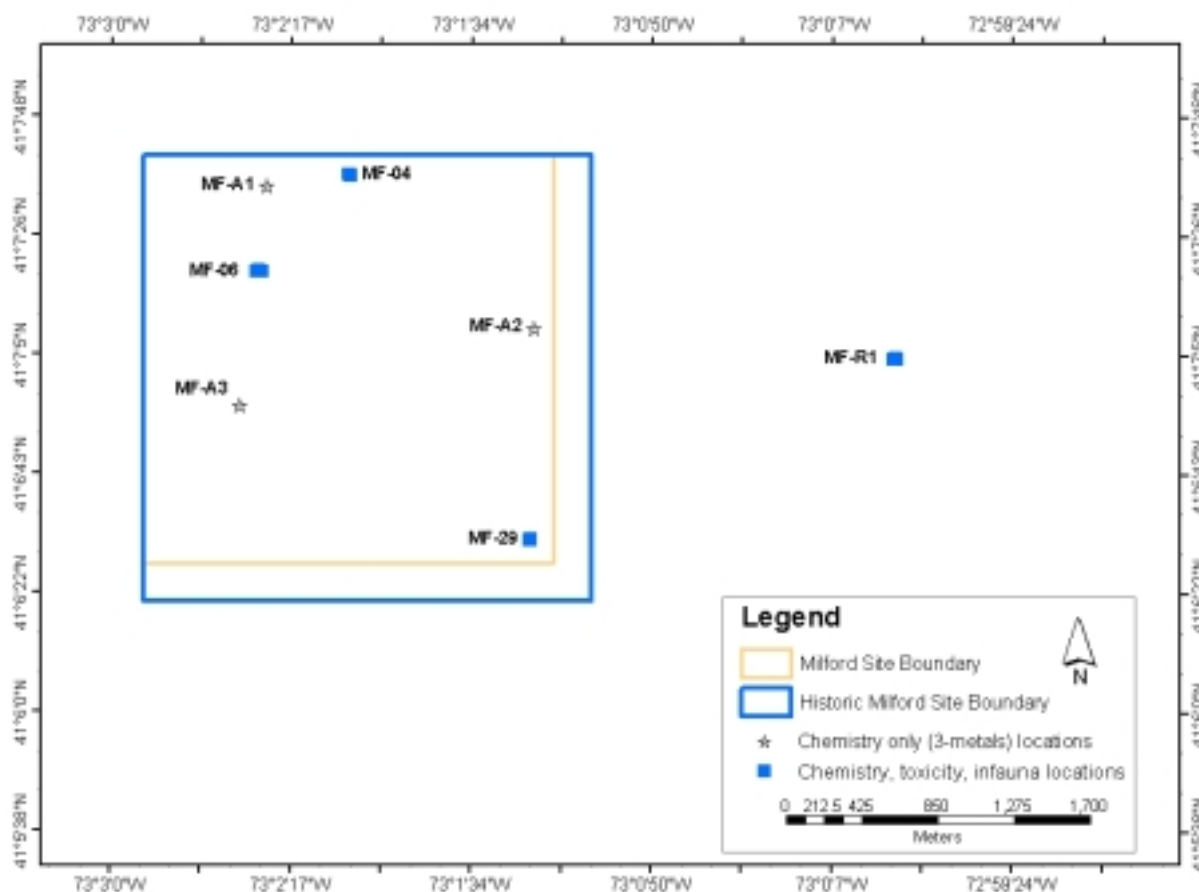


Figure 3. Locations of Stations within the Milford Disposal Site Area Sampled for Use in the Toxicity Testing (from Battelle, 2002b).

2.2 Amphipod Toxicity Test

Toxicity testing of the Long Island Sound sediments followed guidance provided in *Evaluation of Dredged Material Proposed for Ocean Disposal—Testing Manual* (EPA/USACE 1991), also referred to as the “Green Book,” and *Guidance for Performing Tests on Dredged Material to be Disposed of in Open Waters* (EPA/USACE 1989), which provides regional guidance for EPA Region 1 and the USACE New England District. Specifically, a 10-day (*i.e.*, acute) solid phase, static renewal test (*i.e.*, one renewal of water in the test chamber daily) was conducted using *Ampelisca abdita*, a tube-building amphipod typically used for testing fine-grained sediments. Mortality was the endpoint evaluated. Tests were conducted using sediments collected from all of the disposal and reference sites described in Section 2.1.

Test organisms and control sediment samples were obtained from commercial suppliers. *Ampelisca abdita* and its control sediment were obtained from Eastern Aquatic Biosupply of Middletown, Rhode Island through Aquatic Research Organisms of Hampton, New Hampshire.

2.2.1 Sediment Sample Preparation

Nine sediment samples were prepared for the Long Island Sound solid-phase acute toxicity tests: six disposal site test composites, two reference sediments, and one control sediment. Upon receipt at MSL, temperature of the sediments was measured and a sediment subsample was collected for porewater ammonia concentration, salinity, and pH analyses. Test sediments are not typically sieved because the process may alter the chemical or toxicological properties (EPAUSACE, 1991). However, control sediments were sieved through 0.5-mm-mesh sieves to remove any live organisms that might interfere with the bioassay. All sediment samples were stored in MSL's walk-in cold room at 4 ± 2 °C until used in the toxicity test.

2.2.2 Amphipod Acute Toxicity Test Preparation

Ampelisca abdita were delivered to MSL August 7, 2002 in sediment under appropriate conditions to ensure viability. Upon arrival at MSL, the test organisms were acclimated slowly to test conditions, but were not fed during holding. Organisms exhibiting abnormal behavior or appearance during acclimation or initiation were not used in toxicity tests. Receipt, acclimation, and animal care records are part of the data files for this project.

The *Ampelisca* test was initiated on August 13, 2002 by introducing 20 organisms into each test chamber. Test chambers were 1-L glass (Mason) jars modified to permit daily seawater flow-through water renewals. Test chambers were fitted with air and water flow delivering lids, and screened overflow ports. Five replicates of each test sediment were initiated. Water quality parameters (temperature, pH, dissolved oxygen, and salinity) were measured in all replicates of each test prior to test initiation, in one replicate per day during the test, and again in all replicates prior to test termination. Observations of conditions in each chamber were made daily. The amphipods were not fed during testing. All bioassays included a negative (laboratory) control sediment to validate the test, and a concurrent 96-h, water-only, reference toxicant test to assess the sensitivity of the test population. Target test conditions for the acute toxicity test are provided in Table 2.

Ammonia purging and monitoring was conducted following the guidance in *Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods* (EPA 1994a), which calls for aerating the sample and replacing up to two volumes of overlying water per day if ammonia values exceed species thresholds. The porewater ammonia threshold for *A. abdita* is 20 mg/L total ammonia. The sediments were layered on August 12, 2002, the day before the test was initiated and bulk sediment porewater ammonia concentrations were evaluated. Baseline bulk sediment porewater measurements showed that the ammonia concentration threshold was not exceeded for any test sediment, therefore purging was not required to reduce porewater ammonia prior to testing (Table 3). The test was initiated as soon as possible after ammonia levels in all treatments were determined to be below thresholds. During the *A. abdita* bioassay, ammonia was measured in the porewater and the overlying water of surrogate test chambers on Test Days 0, 3, and 10 (Table 4). To maintain low ammonia levels during the test, the overlying water in each test chamber was exchanged once per day.

A water-only reference toxicant test (96 h), using cadmium (Cd) as the toxicant, was initiated concurrently with the solid phase test. Procedures followed those for the sediment test, and test chambers were run without water renewals for the entire test duration. Target test concentrations are listed in Table 2.

Table 2. Target Test Conditions for the Amphipod Solid-Phase Acute Toxicity Tests.

Parameter	<i>Ampelisca abdita</i>
Duration	10 days
Treatments	3 Bridgeport Disposal Site test sediments 1 Bridgeport Reference sediment 3 Milford Disposal Site test sediments 1 Milford Reference sediment <i>A. abdita</i> control
Replicates	5, plus surrogates for ammonia monitoring
Test population	20 individuals per replicate, total $n = 100$ (per treatment)
Flow Regime	Static renewal, 1 exchange per day
Temperature	20 ± 2 °C
Lighting:	Continuous
Dissolved Oxygen	> 4.6 mg/ (= 60% saturation at 20 °C, 30‰)
pH	7.8 ± 0.5
Salinity	30 ± 2 ‰
Ammonia	< 20 mg/L total ammonia in porewater at test initiation
Feeding	None during test
Reference Toxicant	Cadmium at 0, 0.25, 0.5, 1.0, and 2.0 mg/L
10-d Test Validity Criteria	$\geq 90\%$ survival in control sediments

Table 3. Baseline Bulk Sediment Porewater Data for the 10-d Solid-Phase Acute Toxicity Test with *Ampelisca abdita*, Long Island Sound¹.

Sample ID	Station Name	Ammonia (mg/L)	Salinity (‰)	pH (units)
<i>A. abdita</i> Control	—	NM ²	32	7.6
LIS1S02BTX1	BP Reference BP-R1	1.8	28	7.7
LIS1S01FTX1	BP-10	2.0	28	7.6
LIS1S012TX1	BP-14	2.3	28	7.5
LIS1S04ATX1	BP-23	2.4	28	7.6
LIS1S062TX1	Milford Reference MF-R1	3.0	28	7.8
LIS1S068TX1	MF-04	2.3	29	7.7
LIS1S036TX1	MF-06	2.1	28	7.7
LIS1S053TX1	MF-29	2.4	28	7.8

¹Measurements recorded on August 12, 2002 prior to initiation of the test

²Data not available.

Table 4. Ammonia Monitoring Data for the 10-d Solid-Phase Acute Toxicity Test with *Ampelisca abdita*, Long Island Sound August 2002.

Sample ID	Station Name	Date Layered	Porewater Total Ammonia (mg/L)		
			Day 0 13 Aug	Day 3 16 Aug	Day 10 23 Aug
A. <i>abdita</i> Control	—	8/12/02	12.0	14.0	4.7
LIS1S02BTX1	BP Reference BP-R1	8/12/02	8.5	4.1	<i>0.60</i> ¹
LIS1S01FTX1	BP-10	8/12/02	6.7	2.4	1.6
LIS1S012TX1	BP-14	8/12/02	4.2	4.7	<i>0.97</i>
LIS1S04ATX1	BP-23	8/12/02	8.1	9.5	<i>1.5</i>
LIS1S062TX1	Milford Reference MF-R1	8/12/02	7.8	1.4	NM ²
LIS1S068TX1	MF-04	8/12/02	5.1	2.7	1.6
LIS1S036TX1	MF-06	8/12/02	3.8	3.4	<i>0.69</i>
LIS1S053TX1	MF-29	8/12/02	3.0	2.5	1.4

¹ Italicized values were below the instrument calibration range (1–100 mg/L).

² The sample was lost during collection.

The survival data for each concentration were used to calculate the median lethal concentration (the LC₅₀), the concentration that was lethal to 50% of the test organisms. The LC₅₀ was calculated by using the Trimmed Spearman-Kärber method as discussed in the Green Book.

The toxicity test was based on a random design to allow unbiased comparison between treatments. Organisms were randomly allocated to treatments, and treatment replicates were randomly positioned on water tables. Random positions for test chambers were assigned using the discrete random-number generator in Microsoft Excel spreadsheet software.

2.2.3 Toxicity Data Analysis and Interpretation

Disposal Site sediments were defined as acutely toxic, only if the response (survival) in the test sediment differed from that in the reference sediments by more than 20% (for *A. abdita*) and was significantly lower (statistically) than the appropriate reference sediment response. For the purpose of the statistical analysis, the data were evaluated as follows. The arcsine square root of the proportion of organisms surviving was used to stabilize within-class variances. The test and reference treatments were compared by using Fisher's Least Significant Difference (LSD) test. Statistical calculations were performed by using Minitab™ Release 13 (Minitab, Inc., State College, Pennsylvania). Because all disposal site and reference sediments were tested as part of a single randomized experiment, the statistical analyses were conducted on the complete data set. However, the only comparisons reported are those between the Bridgeport Disposal site sediments and the Bridgeport Reference Site sediment and those between the Milford Disposal site sediments and the Milford Reference Site sediment.

3.0 RESULTS

The complete test results by replicate are presented in Appendix A, Table A-1. Among the three Bridgeport Disposal Site test sediments, *A. abdita* mean survival ranged from 88% to 94% (Table 5). During the test termination, the container for sediment BP-23, replicate 1 was found to contain a medium-sized polychaete worm. Survival in this replicate was considerably lower (35%; Appendix A, Table A-1)

than that for the other four replicates (80%–95%), indicating that the presence of the polychaete may have affected amphipod survival, therefore, it was not included in the calculation of mean survival for station BP-23. Inclusion of this replicate would reduce the mean survival from 88% to 77%. Amphipod survival was significantly lower in two Bridgeport Disposal Site sediments (BP-10, BP-23) than in the Bridgeport Reference sediment (Table 5). However, the absolute difference in mean survival between any test sediment and the Bridgeport reference sediment did not exceed 20%. Therefore, Bridgeport Disposal Site sediment does not appear to be acutely toxic (as defined in Section 2.2.3) to *Ampelisca abdita*.

Among the three Milford Disposal Site test sediments, *A. abdita* mean survival ranged from 84% to 91% (Table 5). Amphipod survival was not significantly lower in any Milford Disposal Site sediment than that in the Milford Reference sediment (Table 5). Also, the absolute difference in mean survival between any test sediment and the Milford reference sediment did not exceed 20 %. Therefore, no Milford Disposal Site sediment was acutely toxic (as defined in Section 2.2.3) to *Ampelisca abdita*.

A. abdita mean survival in the Bridgeport Reference sediment was 99% and that in the Milford Reference sediment was 91% (Table 5). Mean survival in the *A. abdita* control sediments was 92% (Table 5), which validates the test.

Water quality parameters (Appendix A, Table A-2) were within the acceptable ranges during the test except for minor deviations in salinity (greater than the upper limit by 0.1 ‰) and one minor deviation in pH (0.1 pH units). These deviations were too small to have affected the test results. Porewater ammonia concentrations were below the threshold value at test initiation (Day 0) and remained below the threshold value for the duration of the testing (Table 4).

Control survival in the cadmium reference toxicant test (78%) was below the acceptability criterion (Appendix A, Table A-3). However, the response in the remaining test concentrations permitted calculation of a dose-response curve. This showed that the test population was about as sensitive as typical *A. abdita* populations that have been tested at MSL. The LC_{50} (0.59 mg/L) was within the control range of 0.33–1.23 mg/L (mean = 0.78 mg/L) as determined for the previous 20 tests of this species conducted at MSL (Appendix A, Figure A-1).

4.0 SUMMARY

Percent survival of *A. abdita* was greater than 80 percent for all stations evaluated. The control survival was acceptable, confirming the validity of the test, and test conditions were generally within acceptable ranges. Based on this analysis, the acute toxicity associated with sediments at the Bridgeport and Milford disposal sites is low.

Table 5. Mean and standard deviation (sd) survival in the 10-d Solid-Phase *Ampelisca abdita* Acute Toxicity Test, Long Island Sound, August 2002.

Sample ID	Station Name	Percent Survival		Statistically Different from Reference?	Absolute Difference from Reference (%)
		Mean	sd		
A. <i>abdita</i> Control	–	92	9	NA	NA
LIS1S02BTX1	BP Reference BP-R1	99	2	NA	NA
LIS1S01FTX1	BP-10	89	9	Yes ¹	–10 ¹
LIS1S012TX1	BP-14	94	4	No	–5
LIS1S04ATX1	BP-23 ²	88	6	Yes	–11
LIS1S062TX1	Milford Reference MF-R1	91	7	NA	NA
LIS1S068TX1	MF-04	87	16	No ³	–4 ³
LIS1S036TX1	MF-06	84	16	No	–7
LIS1S053TX1	MF-29	86	10	No	–5

¹ Bridgeport Disposal Site sediments were compared only to the Bridgeport Reference sediment.

² Only four replicates were included in the data analysis (see text); mean of 5 replicates is equal to 77%.

³ Milford Disposal Site sediments were compared only to the Milford Reference sediment.

5.0 REFERENCES

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APPENDIX A

10-day Solid Phase Test with *Ampelisca abdita*

Table A-1. Results of the 10-day solid phase test using *Ampelisca abdita*,
Long Island Sound sediments, August 2002.

Sample ID	Rep	Number Alive	Number Dead or Missing	Proportion Surviving	Proportion Surviving		
					Mean	Standard Deviation	CV
Bridgeport BP-10							
LIS1S01FTX1	1	18	2	0.90			
LIS1S01FTX1	2	18	2	0.90			
LIS1S01FTX1	3	15	5	0.75			
LIS1S01FTX1	4	18	2	0.90			
LIS1S01FTX1	5	21 ¹	0	1.00	0.89	0.09	10%
Bridgeport BP-14							
LIS1S012TX1	1	19	1	0.95			
LIS1S012TX1	2	18	2	0.90			
LIS1S012TX1	3	19	1	0.95			
LIS1S012TX1	4	18	2	0.90			
LIS1S012TX1	5	20	0	1.00	0.94	0.04	4%
Bridgeport BP-23							
LIS1S04ATX1 ²	1	7	13	0.35 ¹			
LIS1S04ATX1	2	18	2	0.90			
LIS1S04ATX1	3	17	3	0.85			
LIS1S04ATX1	4	19	1	0.95			
LIS1S04ATX1	5	16	4	0.80	0.88	0.06	7%
Bridgeport Reference BP-R1							
LIS1S02BTX1	1	20	0	1.00			
LIS1S02BTX1	2	20	0	1.00			
LIS1S02BTX1	3	19	1	0.95			
LIS1S02BTX1	4	20	0	1.00			
LIS1S02BTX1	5	20	0	1.00	0.99	0.02	2%
Milford MF-04							
LIS1S068TX1	1	19	1	0.95			
LIS1S068TX1	2	13	7	0.65			
LIS1S068TX1	3	20	0	1.00			
LIS1S068TX1	4	15	5	0.75			
LIS1S068TX1	5	20	0	1.00	0.87	0.16	18%
Milford MF-06							
LIS1S036TX1	1	18	2	0.90			
LIS1S036TX1	2	11	9	0.55			
LIS1S036TX1	3	18	2	0.90			
LIS1S036TX1	4	19	1	0.95			

Table A-1. Results of the 10-day solid phase test using *Ampelisca abdita*,
Long Island Sound sediments, August 2002.

Sample ID	Rep	Number Alive	Number Dead or Missing	Proportion Surviving	Proportion Surviving		
					Mean	Standard Deviation	CV
LIS1S036TX1	5	18	2	0.90	0.84	0.16	19%
Milford MF-29							
LIS1S053TX1	1	15	5	0.75			
LIS1S053TX1	2	20	0	1.00			
LIS1S053TX1	3	18	2	0.90			
LIS1S053TX1	4	17	3	0.85			
LIS1S053TX1	5	16	4	0.80	0.86	0.10	11%
Milford Reference MF-R1							
LIS1S062TX1	1	18	2	0.90			
LIS1S062TX1	2	19	1	0.95			
LIS1S062TX1	3	16	4	0.80			
LIS1S062TX1	4	19	1	0.95			
LIS1S062TX1	5	19	1	0.95	0.91	0.07	7%
<i>Ampelisca</i> Control							
Control	1	20	0	1.00			
Control	2	16	4	0.80			
Control	3	17	3	0.85			
Control	4	20	0	1.00			
Control	5	19	1	0.95	0.92	0.09	10%

¹ This replicate was inadvertently stocked with 21 amphipods.

² This replicate contained a medium-sized polychaete that may have affected amphipod survival, therefore it was excluded from the calculation of the mean and sd.

Table A-2. Summary of water quality measurements for the 10-day solid phase test using *Ampelisca abdita*, Long Island Sound sediments, August 2002.

Sample ID	Station ID	Temperature (° C)		Salinity ¹ (‰)		Dissolved Oxygen (mg/L)		pH (units)	
		Min	Max	Min	Max	Min	Max	Min	Max
	target range:	18.0	22.0	28.0	32.0	4.6	NA ²	7.3	8.3
LIS1S02BTX1	BP Reference BP-R1	19.2	19.7	30.9	32.0	6.5	7.9	7.2	8.0
LIS1S01FTX1	BP-10	19.1	19.7	31.0	32.1	6.3	7.9	7.3	8.0
LIS1S012TX1	BP-14	19.2	19.8	31.0	32.1	6.3	7.9	7.4	8.0
LIS1S04ATX1	BP-23	19.2	19.8	30.9	32.1	6.4	7.9	7.3	8.0
LIS1S062TX1	Milford Reference MF-R1	19.2	19.7	30.9	32.1	6.2	7.9	7.3	8.0
LIS1S068TX1	MF-04	19.2	19.7	30.9	32.1	6.1	7.9	7.3	8.1
LIS1S036TX1	MF-06	19.2	19.8	30.9	32.1	6.6	7.9	7.3	8.0
LIS1S053TX1	MF-29	19.2	19.8	29.1	32.1	6.6	7.9	7.4	8.1
Control	—	19.2	19.7	31.0	32.1	6.5	7.9	7.4	8.1

¹ Ambient salinity of Sequim Bay seawater during testing was about 32–33 ‰.

² No maximum target range is specified in the regulations for DO.

Table A-3. Reference toxicant test results (survival and calculated LC₅₀) for the 10-day solid phase test using *Ampelisca abdita*, Long Island Sound sediments, August 2002.

Concentration	Units	Rep	Number Alive	Number Dead or Missing	Proportion Surviving	Proportion Surviving		
						Mean	Standard Deviation	CV
0	mg/L Cd	1	14	6	0.70			
0	mg/L Cd	2	15	5	0.75			
0	mg/L Cd	3	18	2	0.90	0.78	0.10	13%
0.25	mg/L Cd	1	12	8	0.60			
0.25	mg/L Cd	2	15	5	0.75			
0.25	mg/L Cd	3	15	5	0.75	0.70	0.09	12%
0.5	mg/L Cd	1	10	10	0.50			
0.5	mg/L Cd	2	12	8	0.60			
0.5	mg/L Cd	3	11	9	0.55	0.55	0.05	9%
1	mg/L Cd	1	1	19	0.05			
1	mg/L Cd	2	2	18	0.10			
1	mg/L Cd	3	1	19	0.05	0.07	0.03	43%
2	mg/L Cd	1	0	20	0.00			
2	mg/L Cd	2	0	20	0.00			
2	mg/L Cd	3	0	20	0.00	0.00	0.00	NA
	LC ₅₀ Data: 0.59 mg/L (95% Confidence Interval = 0.53-0.66 mg/L)							
	Conc.		0	0.25	0.5	1	2	
	Total #		60	60	60	60	60	
	# Dead		13	18	27	56	60	

Figure A-1. *Ampelisca abdita* reference toxicant control chart showing the results (LC_{50}) of the 20 MSL tests immediately preceding the Long Island Sound testing.

Control Charting Data			
n	mean	sd	Control Range (mean \pm 2 sd)
20	0.78	0.22	0.33 to 1.23 mg/L Cd

Variable: *Ampelisca* Cd LC_{50} (mg/L)

